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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

In re Patent Application of	Atty Dkt. 2380-249
	C# M#
Pål FRENGER et al.	TC/A.U.: 2133
Serial No. 09/643,983	Examiner: Joseph D. Torres
Filed: August 23, 2000	Date: August 15, 2005

Title: A TWO STAGE DATA PACKET PROCESSING SCHEME

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

☐ **Correspondence Address Indication Form Attached.**

☐ **NOTICE OF APPEAL**
Applicant hereby **appeals** to the Board of Patent Appeals and Interferences from the last decision of the Examiner twice/finally rejecting applicant's claim(s). $500.00 (1401)/$250.00 (2401) $

☒ An appeal **BRIEF** is attached in the pending appeal of the above-identified application $500.00 (1402)/$250.00 (2402) $ 500.00

☐ Credit for fees paid in prior appeal without decision on merits -$ ( )

☐ A reply brief is attached. **(no fee)**

☐ Petition is hereby made to extend the current due date so as to cover the filing date of this paper and attachment(s)
One Month Extension $120.00 (1251)/$60.00 (2251)
Two Month Extensions $450.00 (1252)/$225.00 (2252)
Three Month Extensions $1020.00 (1253/$510.00 (2253)
Four Month Extensions $1590.00 (1254/$795.00 (2254) $

☐ "Small entity" statement attached.

Less month extension previously paid on -$( )

TOTAL FEE ENCLOSED $ 500.00

Any future submission requiring an extension of time is hereby stated to include a petition for such time extension. The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our **Account No. 14-1140.** A duplicate copy of this sheet is attached.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

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Serial No. 09/643,983 Group: 2133

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For: A TWO STAGE DATA PACKET PROCESSING SCHEME

Before the Board of Patent Appeals and Interferences

BRIEF FOR APPELLANT
On Appeal From Final Rejection
From Group Art Unit 2133

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APPEAL BRIEF

Sir:

I. REAL PARTY IN INTEREST

The real party in interest is the assignee, Telefonaktiebolaget L M Ericsson (publ), a Swedish corporation.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals related to this subject application. There are no interferences related to this subject application.

III. STATUS OF CLAIMS

Claims 1-4, 10, 34, and 35 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent 5,701,294 to Ward. Claims 5 and 36 stand rejected under 35 U.S.C. §103 as being unpatentable over Ward in view of U.S. Patent 6,397,367 to Park. Claims 6-9, 13-16, 37-39, and 42-44 stand rejected under 35 U.S.C. §103 as being unpatentable over Ward in view of 3GPP TS 25.212, version 3.1.0. Claims 11 and 14 stand rejected under 35 U.S.C. §103 as being unpatentable over Ward. Claims 18-21 and 45 stand rejected under 35 U.S.C. §103 as being unpatentable over Ward in view of a 3GPP document TS 25.212 version 3.1.0 and in view of an excerpt from a Wicker textbook. Claims 22, 23, 26, 28-30, 46, 47, 50, and 52 stand rejected under 35 U.S.C. §103 as being unpatentable over Ward in view of 3GPP TS 25.212 version 3.1.0 and Park. Claims 31-33 and 53 stand rejected under 35 U.S.C. §103 as being unpatentable over Ward in view of 3GPP TS 25,212 version 3.1.0, Park, and Wicker.

IV. STATUS OF AMENDMENTS

No after-final amendments have been submitted. A request for reconsideration was filed after final but did not result in allowance of any claim.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Mobile communication systems must accommodate rapid movement of a mobile radio as the mobile subscriber moves about on foot, in an automobile or other vehicle, etc. Other factors that significantly affect the mobile radio transmission and must be

taken into account are interference from other transmitters, noise, and fading of the desired signal. One way to compensate for the rapidly changing radio environment, without having to change transmit power levels dramatically, is to adapt channel coding and/or modulation parameters used in transmitting data packets over a radio channel. When current radio channel quality conditions are favorable, a larger amount of data may be transmitted during a transmission interval by reducing the amount of channel coding and/or by selecting a higher order modulation scheme. On the other hand, when the current radio channel quality conditions are not as favorable, e.g., the channel is in a fading dip, a smaller amount of data may be transmitted by selecting a more robust set of coding and/or modulation parameters.

In a system that employs fast adaptation of coding and/or modulation parameters, it is usually not known which modulation and/or coding scheme will be used until just prior to transmission because the channel varies so quickly. As a result, a large amount of data packet processing must be performed after the channel condition is detected and the modulation and/or coding scheme is selected. This large amount of processing must be completed before the data can be transmitted. The result is either an increase in hardware requirements or an increase in the processing delay in the transmitter resulting, respectively, in higher costs or slower adaptation to changing channel conditions. Slower link adaptation means slower data transmission speeds resulting from increased retransmissions or a more conservative selection of coding and modulation parameters.

Typically, multiple operations must be performed to prepare data packets for transmission over a communications channel. Supplemental data bits are typically added

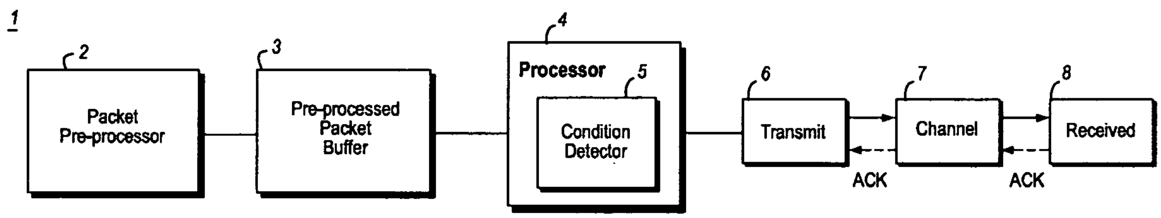
to each data packet. Data packet sequence number bits, CRC bits, and tail bits are examples of such supplemental bits. Sequence numbers may be needed to keep track of which packets have been successfully communicated and/or to ensure that the packets are received in the correct order. CRC (cyclic redundancy check) bits are included to aid the receiver in determining whether a data packet contains errors. Insertion of tail bits may be required for certain types of channel encoders, (e.g., turbo encoders and convolutional encoders), to force the encoder into a predefined state at the end of a data block/packet to be transmitted.

After this type of packet processing, a certain number of processed packets may be combined and channel encoded. The number depends on the selected coding rate and/or modulation scheme. The encoded bits are modulated using a desired modulation scheme. The modulation scheme maps bits into points belonging to the selected signal constellation. Example signal constellations include QPSK, 8-PSK, 16-QAM, and 64-QAM.

The problem then with adapting the modulation scheme and/or coding rate for a rapidly changing communications channel is that how some of those tasks outlined above are performed depends on the particular modulation scheme or coding rate selected. In other words, such tasks cannot be performed until the modulation scheme and/or coding rate is (are) selected. Because the modulation and coding parameters determine the amount of data, (e.g., the number of data packets), to be transmitted in a specific transmission interval, transport block processing operations that depend on the amount of data to transmit cannot be done before the modulation scheme and coding rate for that

transmission interval are selected. And when transmission channel conditions are rapidly changing, there is only a short time period after the selection is made to perform the necessary tasks.

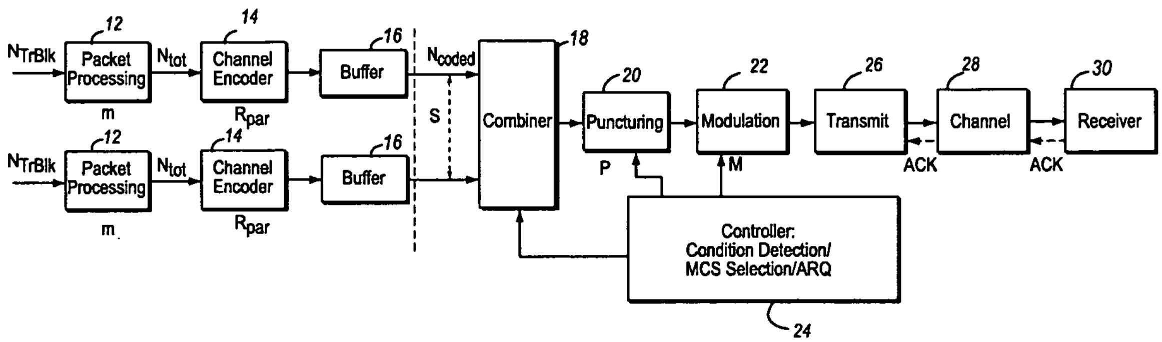
The present invention pre-processes data packets by performing processing operations that do not depend on the selection of a particular modulation scheme and/or coding rate. For example, packet processing, channel encoding, and buffering may be performed as soon as data packets to be transmitted are available. See the example shown in Figure 2 reproduced below.



The packet pre-processor 2 performs various packet processing operations that must be or are desired to be performed on the data packets to be transmitted over the communications channel 7, but which do not depend upon the current condition of the communications channel. The pre-processed data packets are held in the buffer 3 until the current communications condition detected by condition detector 5 is known for the transmission time interval when the packets are to be transmitted over the communications channel 7. Once the processor 4 detects the current condition from detector 5, the pre-processed packets are further processed based upon the detected current condition and transmitted over the channel via transmitter 6. The receiver 8 detects the transmitted information and sends an acknowledgment signal (either positive, negative, or no acknowledgment) as appropriate. If the data is negatively acknowledged,

it can be retrieved from the buffer 3 already pre-processed and immediately processed by processor 4 based on the current condition detected by detector 5.

Fig. 4 illustrates another example implementation that employs a single transport block combiner 18 that operates based on the detected channel condition and is reproduced below:



The size (number of bits) of each transport block is denoted N_{TrBlk}. Each data packet is processed by a packet processing block 12 that adds m bits to each data packet. Each packet processing block 12 may be used to perform one or more packet processing operations including, for example, inserting packet sequence numbers, CRC bits, and/or tail bits. Sequence numbers may be needed to keep track of which packets have been successfully communicated and to ensure that the packets are received in the correct order. Cyclic redundancy check (CRC) bits are used to determine whether a data packet contains any errors. Tail bits are made to be inserted for certain types of channel encoders, such as turbo encoders and convolutional encoders, to force the encoder to a predefined state at the end of the transport block.

The resulting processed packet includes $N_{tot} = (N_{TrBlk} + m)$ bits which are then channel encoded by a fixed rate parent channel encoder 14 having a <u>fixed</u> coding rate of

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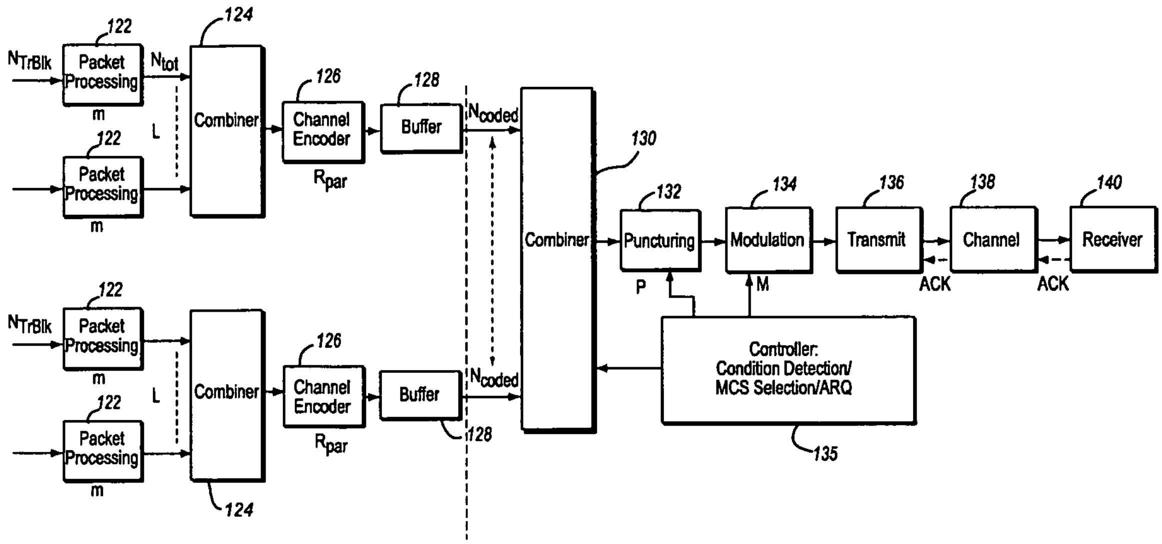
R_{par} so that the output of each channel encoder is $N_{coded} = N_{tot} / R_{par}$ bits. The channel encoded bits are then stored in a corresponding buffer 16 at the end of the pre-processing operations. Of course, other pre-processing operations and/or different pre-processing operations may be employed.

The vertical dashed line indicates that the operations which follow depend upon the selection of a modulation and coding scheme (MCS) for the relevant transmission time interval. A controller block 24 detects the condition of the communications channel and selects a particular MCS best suited for that current condition. The MCS selection is then provided to the transport block combiner 18, the puncturing block 20, and the modulation block 22. Once the MCS scheme is known, then the number of data packets to be included in the transmission interval(s) is (are) known. The combiner 18 reads S = L x K pre-encoded data blocks from the buffers 16 connected to the channel encoders 14. The factor L is known in advance, but the factor K depends on the MCS. The output from the combiner is a "super-block" consisting of S pre-encoded blocks. This "super-block" contains all the information that will be transmitted in the present transmission interval. Thus, when the MCS is known, the combiner 18 knows how much data to read from the buffers 16.

Figure 6 shows another example implementation with dual combiners 124 that do not depend on the channel condition and is reproduced here:



Before the combining of K encoded blocks in a second combiner block 130, the MCS selected for the current transmission interval must be known. However, all operations before this second combiner 130 are performed without knowledge of and independently from the MCS and channel condition. Since the packet processing 122, combining 124, and channel encoding 126 operations are performed independently of the MCS and channel condition, these computationally intensive and/or time consuming operations may be performed before the channel condition is determined and the MCS decision is made. This pre-processing of data packets as soon as they are available significantly speeds up the data packet processing, thereby permitting higher data transmission rates. Moreover, use of the L-packet combiners 124 increases the data block size from N_{tot} to N_{tot} x L which improves the performance of the channel encoder 126. The controller 135 detects for each transmission interval the current communications channel condition. In response to that detection, controller 135 selects

the value for K used to select the number of coded blocks, the puncturing pattern, and the modulation scheme.

If the block size of the channel encoder is only the total number of bits corresponding to a data packet plus its supplemental bits, this relatively small data block size negatively impacts the channel encoder performance for some encoder structures and increases Automatic Repeat reQuest (ARQ) signaling loads. ACK/NACK signals may be sent for specific groups of data packets transmitted in the same transmission interval by receiver 140. Referring to Fig. 6, L data packets are grouped together and then encoded by the same channel encoder. Even though each transport block/data packet includes an error indication field, (e.g., added CRC bits), an ACK may be sent for a specific group of L packets if all L packet error indicators within the group of L packets indicate that each of the L packets is correctly received. Otherwise, all L packets in that group are retransmitted. A significant advantage with this ACK/NACK scheme is that the amount of required control signaling compared to individual data packet ACK/NACK schemes is reduced by a factor of L. Furthermore, because the amount of required control signaling is independent of L, when L equals the number of channels used for packet data transmission, a fixed control signaling scheme may be used, even if the value of L varies.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The rejections to be reviewed on appeal include the anticipation rejection based on Ward and the multiple obviousness rejections set forth in section III above.

VII. ARGUMENT

A. The Ward Reference Lacks Multiple Claim Features

Commonly-assigned Ward teaches a system for flexible coding, modulation, and time slot allocation in a radio telecommunications network. Ward's focus is to dynamically adapt the user bit rate of a TDMA cellular system to achieve optimum voice quality over a broad range of radio channel conditions based on continuously monitored radio channel quality on the uplink and the downlink. The "system's combination of speech coding, channel coding, modulation, and number of assignable time slots per call" is dynamically adapted "to optimize voice quality for the measured conditions." See Abstract. Ward illustrates different "combination types" in Table II in column 9. Cost functions may be employed, and Ward seeks to find the "combination-type" of speech coding, channel coding rate, modulation, and number of assignable time slots per call with the lowest cost for the measured radio channel conditions to get the best voice quality that those current channel conditions allow.

Some data transmission processing operations in a radio communications system depend on certain current radio channel conditions, and therefore, those processing operations need to be dynamically adaptable. But on the other hand, the inventors of the present application recognized that certain other processing operations *do not depend on current channel conditions*. As a result, they can be performed in advance without waiting for a current channel condition to be detected or for processing determinations to be made that do depend on the current channel condition. More specifically, as described in the summary above and in the instant application, certain packet processing operations,

channel encoding operations, and buffering operations may be performed as soon as the data packets are available, and there is no need to wait for the current channel condition to be determined. By performing computationally intensive operations that do not depend on the modulation scheme or coding rate in advance, processing efficiency is increased. Neither this recognition nor this advantage is described in Ward.

All the independent claims recite (1) pre-processing of data packets including performing a first coding operation on those packets to perform pre-processed data packets and (2) that "the pre-processing does not depend on the current channel condition." For example, claim 34 recites a "first processing stage" to do that pre-processing independent of detecting the current channel condition. But the claimed modulation selection and a further coding of the pre-processed data packets recited in all the independent claims do depend on the current channel condition, and thus, must be performed after the channel condition is determined. See for example the "second processing stage" recited in claim 34.

This division of processing operations into pre-processing operations that do not depend on the current channel condition and processing operations that do depend on the current channel condition is quite different than Ward's approach in which all such operations are performed dependent upon the current detected channel conditions. This is apparent when viewing Ward's Fig. 3A in which "arrows" from the "combination type" Table 28 are directed to every one of the processing blocks, indicating that each operation performed is dynamically adjustable depending upon the current channel condition. Appellants are not suggesting, as the Examiner asserts in the Advisory Action,

this figure requires that "switching of all processors in Figure 3A of Ward must respond to channel conditions." Appellants did not argue this and did not offer a "complete mischaracterization" of Ward as the Examiner asserts. The fact is that the channel quality affects which combination type in Table II (28) is selected. The Board is requested to review for itself that Table II in column 9, lines 5-12. It is plain that each category—time slots, modulation, voice coder, and rate—changes at least once in the table. Each combination type is described by Ward as being optimized for a particular channel condition. One of those combination types is selected as best suited for the detected channel condition. In other words, each combination type depends on the channel condition.

Significantly, there is no disclosure or suggestion in Ward that some operations not be performed in dependence on the channel condition determination. Clearly, the type cannot be selected until the channel condition is determined. This is apparent in the description at column 6, lines 52-60:

> In the system of the present invention, the instantaneous radio channel quality (i.e., C/I ratio) is continuously monitored....The system dynamically responds to the measured C/I by selecting whichever of the combination of types A, B, or C gives the maximum voice quality for the required robustness at the measured C/I level.

See also Figure 6 where the C/I (channel quality) is estimated in block 32, followed by the cost total C_{tot} being determined for all supported combination types in block 33 and the combination type with the lowest cost being selected in block 34. The combination type selection clearly depends on the channel condition contrary to the pre-processing operations recited in the independent claims.

The Examiner argues that because Ward's combination table shows that there is no switching of the speech coder 21 when switching between combination types 2 and 3, that the speech coder 21 used is independent of the channel condition. Switching is not the issue. Ward's combination type, regardless of whether it is currently being used or its being switched to, still must be selected. Ward is clear that the selection depends on the channel condition.

Nor does the Examiner's "inherency" argument hold up under examination. That Ward's speech coder 21[1] could potentially be modified so that it is not dependent based upon current channel conditions is not disclosed or suggested in Ward. When the patent was granted for the first application of a computer, that patent did not preclude subsequent patents on other computer applications even though a computer itself is "inherently" "capable" of performing a wide variety of applications. Indeed, the Federal Circuit rejected this kind of sweeping "capability" argument with respect to inherency, stating that "inherency, however, may not be established by probabilities or possibilities." *In re Robertson*, 49 USPQ2d 1949, 1951 (Fed. Cir. 1999).

No where does Ward distinguish between a first pre-processing stage that does not depend on current channel conditions and a second processing stage that does. All

[1] Although The Examiner refers to the speech coder 21 in the Advisory action as "the speech preprocessing coder 21," Ward simply refers to a speech coder 21. See for example column 5, line 51.

processing stages in Ward are grouped together for each combination type. And each combination type is selected once the current channel condition is known so that the best combination type for that condition is selected. Processing of speech cannot occur by the speech coder 21 in Ward until and unless one of the combination types has been selected. That selection depends on the detected channel condition C/I.

Lacking the claimed channel condition independent pre-processing coupled with the claimed channel condition-dependent processing, Ward lacks features from every independent claim. The anticipation rejection based on Ward is improper and should be withdrawn.

B. The Obviousness Rejections Based on Ward Are Improper

Claims 5 and 36 require that "the pre-processing includes channel encoding the data packets at a fixed coding rate." Ward does not teach this, and Park is cited to show fixed rate encoding. But the claims are not directed simply to fixed rate encoding. The claims require that the pre-processing coding operation be channel encoding (as opposed to speech or source coding) and that it be performed at a fixed rate. Park, as already established earlier in the prosecution of this application, does not teach the claimed pre-processing. So even if the two references were combined, they would still not teach every feature from their respective independent claims.

Moreover, there is no proper motivation to combine these two patents. The whole point of Ward is to have the flexibility to change the combination type to match the current channel condition. Indeed, Table II shows the rates change depending on which combination type is selected. To modify Ward to make a channel coding rate *fixed* across

all channel conditions is to defeat the stated purpose of Ward's invention—to "*dynamically* [adapt] a cellular system's combination of speech coding, *channel coding*, modulation, and number of assignable time slots per call to achieve optimum voice quality over a broad range of C/I conditions." Column 3, lines 31-34 (emphasis added). The Federal Circuit has found this type of modification impermissible. *In re Gordon*, 733 F.2d 900, 904 (Fed. Cir. 1984).

For claims 6-9, 13-16, 37-39, and 42-44, the Examiner adds the 3GPP technical specification. This 3GPP technical specification does not remedy the deficiencies in Ward demonstrated above. The various operations are not described as being performed as part of a pre-processing stage that does not depend on the detected channel condition.

The rejection of claims 18-21 and 45 requires the citation of Ward, the 3GPP technical specification, and Wicker. The text in Wicker on page 402 relied on by the Examiner simply relates to ARQ for individual packets. But the claims rejected require that multiple data packets be combined into data blocks. The advantages of reduced ARQ signaling using this block approach were explained in the Summary section above. So even if the combination could be made (the rejection is now up to three references), that combination would not result in the claimed features. Nor does Wicker remedy the deficiencies noted above for the claims upon which claims 18-21 and 45 depend.

To reject claims 22, 23, 26, 28-30, 46, 47, 50, and 52, the Examiner relies on Ward, the 3GPP technical specification, and Park. Independent claim 22 sets forth <u>multiple</u> pre-processing steps that do not depend on the current channel condition and multiple processing steps that are performed based on the detected current channel

condition. It has already been established that none of these three references teach even the one pre-processing step or stage recited in claims 1 and 34, respectively. So plainly they lack a teaching of performing multiple pre-processing steps that do not depend on the current channel condition and multiple processing steps that are performed based on the detected current channel condition. Nor do they teach the following specific pre-processing steps or stages:

- combining a first set of data blocks to produce a first set of combined data blocks;
- combining a second set of data blocks to produce a second set of combined data blocks;
- encoding the first set of combined data blocks to produce a first channel encoded data block;
- encoding the second set of combined data blocks to produce a second channel encoded data block.

The lack of proper motivation to combine these references is even more pronounced in this setting where the references lack multiple, specifically recited functions being performed in the pre-processing which is channel condition-independent.

The rejection of claims 31-33 and 53 requires four references. The piece meal, hindsight reconstruction of these claims is self-evident. And as already noted above, the page of the Wicker text relied on by the Examiner relates to ARQ for packets and not blocks that contain multiple packets.

VIII. CONCLUSION

Features of the independent claims are not disclosed or suggested by Ward alone or in combination with the supporting references relied on by the Examiner. There is no proper motivation to combine their teachings as the Examiner proposes. Each missing claim feature as well as the lack of motivation for each reference combination is an independent ground for reversal. The Board should reverse the outstanding rejections.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: John R. Lastova
Reg. No. 33,149

JRL/sd
Enclosures
Appendices

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IX. CLAIMS APPENDIX

1. A method for processing data packets for transmission over a communications channel, comprising:

pre-processing data packets for transmission over the communications channel including performing a first coding operation on those data packets to form pre-processed data packets;

detecting a current channel condition; and

processing the pre-processed data packets including modulating the pre-processed data packets using a modulation scheme selected from a group of different modulation schemes based on the detected current channel condition and coding the pre-processed data packets using a coding rate selected from a group of different coding rates based on the detected current channel condition to form processed data packets ready for transmission over the communications channel,

wherein the pre-processing does not depend on the current channel condition.

2. The method in claim 1, wherein the current condition is the current condition of the communications channel.

3. The method in claim 2, wherein the current condition is the current condition of the communications channel during a current transmission time interval.

4. The method in claim 1, wherein the current condition relates to a communications service.

5. The method in claim 1, wherein the pre-processing includes channel encoding the data packets at a fixed coding rate.

6. The method in claim 1, wherein the pre-processing includes combining the data packets into data blocks.

7. The method in claim 6, wherein the pre-processing includes adding supplemental bits to each of the data packets before combining.

8. The method in claim 7, wherein the supplemental bits include one or more of the following types of information: error detection information, error correction information, tail information, and data packet sequence information.

9. The method in claim 6, wherein the pre-processing includes channel encoding the data blocks at a fixed coding rate to form the pre-processed data blocks.

10. The method in claim 1, wherein the processing includes obtaining a coding rate desired for the current condition.

11. The method in claim 1, wherein the group of modulation schemes includes: QPSK, 8-PSK, 16-QAM, AND 64-QAM.

13. The method in claim 1, wherein the processing includes combining the pre-processed data packets.

14. The method in claim 13, wherein the combining is performed based on the current condition.

15. The method in claim 13, wherein the processing further includes manipulating the combined pre-processed data packets to achieve a coding rate desired for the current channel condition.

16. The method in claim 15, wherein the manipulating is performed in accordance with a puncturing scheme selected based on the detected current channel condition that achieves the desired coding rate.

18. The method in claim 6, further comprising:

waiting for an acknowledgement signal for each of the data blocks, and

if an acknowledgement signal is not received for one of the data blocks, retransmitting the data block.

19. The method in claim 18, further comprising:

storing the data blocks in a retransmission buffer awaiting the acknowledgement signal.

20. The method in claim 19, further comprising:

retransmitting an unacknowledged data block using the same processing employed when the unacknowledged data block was first transmitted.

21. The method in claim 19, further comprising:

retransmitting an unacknowledged data block using different processing from the processing employed when the unacknowledged data block was first transmitted.

22. A method for processing data packets for transmission over a communications channel, comprising:

pre-processing data packets for transmission over the communications channel including performing a first coding operation on those data packets to form pre-processed data packets;

detecting a current channel condition; and

processing the pre-processed data packets based on the detected current condition to form processed data packets ready for transmission over the communications channel,

wherein the pre-processing does not depend on the current condition and includes:

combining a first set of data blocks to produce a first set of combined data blocks;

combining a second set of data blocks to produce a second set of combined data blocks;

encoding the first set of combined data blocks to produce a first channel encoded data block;

encoding the second set of combined data blocks to produce a second channel encoded data block, and wherein the processing includes:

combining the first and second channel encoded data blocks in a manner that depends on the detected current channel condition to produce a combined channel encoded data block;

selecting a puncturing pattern based on the detected current channel condition;

puncturing one or more bits from the combined channel encoded data block in accordance with the selected puncturing pattern to achieve a desired coding rate;

selecting one of plural modulation schemes based on the detected current channel condition; and

modulating the punctured data block in accordance with the selected modulation scheme.

23. The method in claim 22, further comprising:

adding supplemental information to a first set of data packets to produce the first set of data blocks, and

adding supplemental information to a second set of data packets to produce the second set of data blocks.

26. The method in claim 22, further comprising:

determining the desired channel rate based on the detected channel condition.

28. The method in claim 22, further comprising:

detecting a change in current transmission condition, and

determining how the first and second channel encoded data blocks should be combined based on the changed condition.

29. The method in claim 22, further comprising:

detecting a change in current transmission condition, and

determining a new desired channel rate from the changed condition.

30. The method in claim 22, further comprising:

detecting a change in current transmission condition, and

determining a new modulation scheme from the changed condition.

31. The method in claim 22, further comprising:

waiting for an acknowledgement signal for the first and second channel encoded data blocks;

detecting that one of the first and second channel encoded data blocks is not acknowledged; and

retransmitting the one channel encoded data block.

32. The method in claim 22, further comprising:

storing the first channel encoded data block in a first buffer, and

storing the second channel encoded data block in a second buffer.

33. The method in claim 32, further comprising:

retransmitting one of the first or second encoded data blocks from a corresponding one of the first and second buffers.

34. Apparatus for use in a transmitter which transmits data over a communications channel, comprising:

a first processing stage configured to pre-process data packets for transmission over the communications channel including performing a first coding operation on those data packets to form pre-processed data packets;

a detector configured to detect a current communications channel condition; and

a second processing stage configured to process the pre-processed data packets including modulating the pre-processed data packets using a modulation scheme selected from a group of different modulation schemes based on the detected communications channel condition and coding the pre-processed data packets using a coding rate selected from a group of different coding rates based on the detected current channel condition to form processed data packets ready for transmission over the communications channel,

wherein the first processing stage pre-processing does not depend on the current communications channel condition.

35. The apparatus in claim 34, further comprising:

a controller configured to control the configuration of the second processing stage based on the detected communications condition.

36. The apparatus in claim 34, wherein the first processing stage includes a channel encoder configured to encode the data packets at a fixed coding rate.

37. The apparatus in claim 34, wherein the first processing stage is configured to combine the data packets into data blocks.

38. The apparatus in claim 37, wherein the first processing stage is configured to add supplemental bits to each of the data packets before combining.

39. The apparatus in claim 38, wherein the supplemental bits include one or more of the following types of information: error detection information, error correction information, tail information, and data packet sequence information.

41. The apparatus in claim 34, wherein the group of modulation schemes includes: QPSK, 8-PSK, 16-QAM, and 64-QAM .

42. The apparatus in claim 34, wherein the second processing stage is configured to combine the pre-processed data packets.

43. The apparatus in claim 42, wherein the combining is performed based on the current channel condition.

44. The apparatus in claim 34, wherein the second processing stage is configured to manipulate the combined pre-processed data packets using a puncturing scheme selected based on the detected current channel condition.

45. The apparatus in claim 34, further comprising:

a buffer configured to store the pre-processed data packets.

46. Apparatus for use in a transmitter which transmits data over a communications channel, comprising:

a first processing stage configured to pre-process data packets for transmission over the communications channel including performing a first coding operation on those data packets to form pre-processed data packets;

a detector configured to detect a current communications channel condition; and

a second processing stage configured to process the pre-processed data packets based on the detected communications condition to form processed data packets ready for transmission over the communications channel,

wherein the first processing stage pre-processing does not depend on the current communications condition and includes:

a first combiner configured to produce a first set of combined packets;

a second combiner configured to produce a second set of combined packets;

a first encoder, coupled to the first packet combiner, configured to encode the first set of combined packets;

47. The apparatus in claim 46, further comprising:

a first packet processor configured to add supplemental information to a first set of data packets to produce the first set of data blocks, and

a second packet processor configured to add supplemental information to a second set of data packets to produce the second set of data blocks.

50. The apparatus in claim 46, further comprising:

a controller configured to determine the desired channel rate based on the detected channel condition.

52. The apparatus in claim 46, wherein the first and second packet combiners and the first and second encoders are configured to function independently of the transmission condition.

53. The apparatus in claim 46, further comprising:

a first buffer storing the first channel encoded data block, and

a second buffer storing the second channel encoded data block.

X. EVIDENCE APPENDIX

There is no evidence appendix.

XI. RELATED PROCEEDINGS APPENDIX

There is no related proceedings appendix.